

DEFORM™ News

Events:

- November 5 and 6, 2014: DEFORM User Group meeting will be held at the Bridgewater Conference Center in Powell, OH.

Training:

- December 9-12, 2014: DEFORM training will be conducted at the SFTC office in Columbus, OH.
- February 24-27, 2015 (tentative): DEFORM training will be conducted at the SFTC office in Columbus, OH.

FORMING EXPRESS

The DEFORM™-F2 & DEFORM™-F3 systems have provided an easy to use interface for simulating forming operations. They utilize a simplified user interface with intelligent default settings. Traditionally this module has been used at smaller companies where engineers are tasked with a wide range of responsibilities and time is at a premium. Typical applications include forging, extrusion, drawing, heading and upsetting. **FORMING EXPRESS** is the next-generation of this product.

FORMING EXPRESS includes separate operations for forming, heat transfer, die stress and 2D to 3D conversion. Each operation is defined in a template format similar to F2 & F3. The first operation is setup, saved and run, as in previous versions. Successive operations can be run one-by-one (interactive mode) or sequentially (batch mode).

Batch mode is utilized by chaining several operations together. Operations are run in order from left to right. One or more operations can also be cycled numerous times. Cycling can be used to repeat a forming process or determine the steady state process outputs. A typical forging process may require: heat transfer (air cool) > heat transfer (rest on die) > forming (blocker) > heat transfer (dwell on die) > forming (finish) > heat transfer (cool). While a cold formed fastener may have several 2D axisymmetric operations, followed by 2D to 3D conversion and one or more 3D forming operations.

Running a progression in batch mode requires a good understanding of the entire forming process from beginning to end. Object positioning, tool movement, stopping criteria and inter-object data must be defined for each operation. Tool geometry can be passed to subsequent operations, created from geometry primitives or imported from CAD files. The workpiece will progress through all of the operations by default.

Because the workpiece shape is unknown in future operations the user cannot manually position the tools to the workpiece or generate contact. Instead action keywords must be used to carry out these functions during runtime. Action keyword functions include contact generation, positioning, forced remeshing and database generation.

Scheduled positioning is used to position objects between operations. All objects in the selected operation can be positioned or used as a reference. Interference, offset, rotation and flipping methods are applied in the order that they are defined. Once defined, it is also possible to reorder and edit the list of definitions.

Configuring a simulation to run with multiple operations offers several benefits. Using this method saves time because the simulation does not require user input between operations. This methodology also makes it easy to change input variables and rerun the project. Finally the MO environment provides a system that can support project templates. A previously run project file can serve as a template for another similar process. By modifying an existing template the user can minimize setup time and input errors.

FORMING EXPRESS offers several new features in addition to the MO environment. A contact area stopping criteria has been added. This feature calculates the percentage of contact surface length (2D) or surface area (3D). The simulation will stop when the calculated percentage has exceeded that defined. This tool, along with the load stopping criteria, is essential for processes where the exact tool stopping position is unknown. Promotion of a forming express operation to a forming operation has been implemented. This allows fast and easy simulation setup as well as access to advanced features for users with 2D/3D licenses. Hammer and screw press inputs have been refined to allow more control when performing multiple blows. And sliding dies movement is also available.



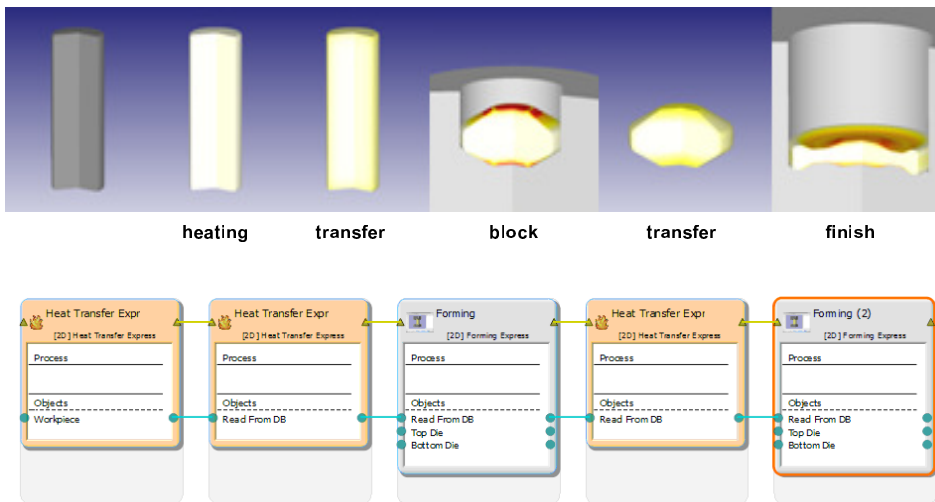
Heating Express

Heating express is an operation type designed to easily add heat transfer before or after a forming express operation. Furnace heating, transfer, dwell, rest on die and quenching operations are all supported. This system uses smart default settings that minimize simulation setup effort and time. Boundary conditions, environment settings and time step controls are automatically applied but can also be overwritten manually.

Die Stress

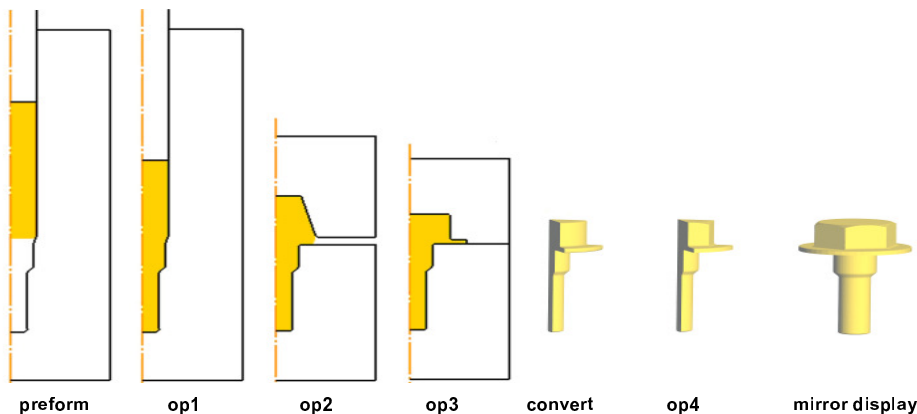
Decoupled elastic die stress is available in the MO environment. This can be setup before the forming operation has been run. During runtime the forces from the last step of the forming operation will be interpolated to the tools and the die stress simulation will be run. It is also possible to run die stress after simulating the forming operation by selecting the appropriate step number.

Example 1: Gear with Heat Transfer



The gear progression along with the user interface Operation Editor is shown above. A mixture of forming and heat transfer operations were used to define this process.

Example 2: 2D to 3D Bolt Progression



The cold forming bolt progression with 2D to 3D conversion is shown above. After three 2D forming operations the workpiece was converted to 3D (60 degree section) for the final operation. Mirroring was used to display the full hexagonal bolt.

DEFORM Version 11.0.1 and 11.0.2 Releases

DEFORM V11.0.1 was released in June. Enhancements include:

- 3D multi-blow operation for hammer forming added to MO environment
- consolidation of heating express operations
- DOE support of speed definition as a function of time
- efficient handling of 64-bit configuration during run time
- advanced mesh controls for die stress operations added (MO environment)
- various bug fixes and stability improvements

DEFORM V11.0.2 is scheduled for release by the end of the year. Improvements include:

- target volume calculation restored for 3D FORMING EXPRESS
- improved report generator
- PIP (picture-in-picture) implemented in next generation post-processor to view multiple database files
- geometry reference point location updated even when not used in the stopping criteria
- quarter symmetry ALE shape rolling rotation supported
- various bug fixes and stability improvements

Development for DEFORM V11.1 is underway and targeted for a 1st quarter 2015 release. DEFORM V11.1 will contain the integrated 2D/3D system as well as DEFORM-F23 user interfaces. Over time these will be phased out and replaced by the DEFORM Multiple Operations GUI.